

CLAIMS

WHAT IS CLAIMED IS:

1. An isolated protein comprising a polypeptide that is at least 80% identical to a polypeptide selected from the group consisting of:

- a) a polypeptide having the sequence of amino acid residue 1 to amino acid residue 65 of SEQ ID NO:2;
- b) a polypeptide having the sequence of amino acid residue 19 to amino acid residue 65 of SEQ ID NO:2;
- c) a polypeptide having the sequence of amino acid residue 21 to amino acid residue 65 of SEQ ID NO:2;
- d) a polypeptide having the sequence of amino acid residue 1 to amino acid residue 67 of SEQ ID NO:10;
- e) a polypeptide having the sequence of amino acid residue 21 to amino acid residue 67 of SEQ ID NO:10; and
- f) a polypeptide having the sequence of amino acid residue 23 to amino acid residue 67 of SEQ ID NO:2;

wherein said polypeptide has cysteine residues corresponding to amino acid residues 33, 40, 45, 55, 62 and 63 of SEQ ID NOs:2 or 10.

2. An isolated protein of Claim 1, wherein the amino acid percent identity is determined using a FASTA program with ktup=1, gap opening penalty=10, gap extension penalty=1, and substitution matrix=BLOSUM62, with other parameters set as default.

3. An isolated protein of Claim 1, wherein said protein comprises a polypeptide having the sequence selected from the group consisting of:

- a) a polypeptide having the sequence of amino acid residue 1 to amino acid residue 67 of SEQ ID NO:10;
- b) a polypeptide having the sequence of amino acid residue 21 to amino acid residue 67 of SEQ ID NO:10; and

c) a polypeptide having the sequence of amino acid residue 23 to amino acid residue 67 of SEQ ID NO:10.

4. A polypeptide selected from the group consisting of:

a) amino acid residue 30 to amino acid residue 63 of SEQ ID NO:2;

b) amino acid residue 31 to amino acid residue 63 of SEQ ID NO:2;

c) amino acid residue 30 to amino acid residue 64 of SEQ ID NO:2;

d) amino acid residue 31 to amino acid residue 64 of SEQ ID NO:2; and

e) a polypeptide chosen from SEQ ID NOS:14-72.

5. A pharmaceutical composition comprising a polypeptide selected from the group consisting of:

a) a protein according to claim 1;

b) amino acid residue 30 to amino acid residue 63 of SEQ ID NO:2;

c) amino acid residue 31 to amino acid residue 63 of SEQ ID NO:2;

d) amino acid residue 30 to amino acid residue 64 of SEQ ID NO:2;

e) amino acid residue 31 to amino acid residue 64 of SEQ ID NO:2; and

f) a polypeptide chosen from SEQ ID NOS:14-72;

in combination with a pharmaceutically acceptable vehicle.

6. An antibody that specifically binds to a protein of Claim 1.

7. An anti-idiotypic antibody of an antibody which specifically binds to a protein of Claim 1.

8. An isolated polynucleotide molecule encoding a protein, said polynucleotide molecule consisting of a coding strand and a complementary non-coding strand, wherein said polynucleotide molecule encodes a polypeptide that is at least 80% identical to the amino acid sequence to a polypeptide selected from the group consisting of:

- a) a polypeptide having the sequence of amino acid residue 1 to amino acid residue 65 of SEQ ID NO:2;
- b) a polypeptide having the sequence of amino acid residue 19 to amino acid residue 65 of SEQ ID NO:2;
- c) a polypeptide having the sequence of amino acid residue 21 to amino acid residue 65 of SEQ ID NO:2;
- d) a polypeptide having the sequence of amino acid residue 1 to amino acid residue 67 of SEQ ID NO:10;
- e) a polypeptide having the sequence of amino acid residue 21 to amino acid residue 67 of SEQ ID NO:10; and
- f) a polypeptide having the sequence of amino acid residue 23 to amino acid residue 67 of SEQ ID NO:2;

wherein said polypeptide has cysteine residues corresponding to amino acid residues 33, 40, 45, 55, 62 and 63 of SEQ ID NOS:2 or 10.

9. An isolated polynucleotide molecule according to claim 8, wherein the amino acid percent identity is determined using a FASTA program with ktup=1, gap opening penalty=10, gap extension penalty=1, and substitution matrix=BLOSUM62, with other parameters set as default.

10. An isolated polynucleotide molecule according to claim 8, wherein said polynucleotide molecule remains hybridized following stringent wash conditions to a polynucleotide consisting of the nucleotide sequence of SEQ ID NO:9, or the complement of SEQ ID NO:9.

11. An isolated polynucleotide molecule encoding a protein having cysteine residues corresponding to amino acid

residues 33, 40, 45, 55, 62 and 63 of SEQ ID NO:10, said polynucleotide molecule consisting of a coding strand and a complementary non-coding strand, wherein said polynucleotide comprises a nucleotide sequence that is at least 80% identical to the sequence of a polynucleotide selected from the group consisting of:

a) a polynucleotide as shown in SEQ ID NO:9 from nucleotide 220 to nucleotide 420;

b) a polynucleotide as shown in SEQ ID NO:9 from nucleotide 280 to nucleotide 420; and

c) a polynucleotide as shown in SEQ ID NO:9 from nucleotide 286 to nucleotide 420.

12. An isolated polynucleotide molecule encoding a protein having cysteine residues corresponding to amino acid residues 33, 40, 45, 55, 62 and 63 of SEQ ID NO:10, said polynucleotide molecule consisting of a coding strand and a complementary non-coding strand, wherein said polynucleotide comprises a nucleotide sequence as shown in SEQ ID NO:11.

13. An isolated polynucleotide molecule encoding a polypeptide selected from the group consisting of:

a) amino acid residue 30 to amino acid residue 63 of SEQ ID NO:2;

b) amino acid residue 31 to amino acid residue 63 of SEQ ID NO:2;

c) amino acid residue 30 to amino acid residue 64 of SEQ ID NO:2;

d) amino acid residue 31 to amino acid residue 64 of SEQ ID NO:2; and

e) a polypeptide chosen from SEQ ID NOS:14-72.

14. An isolated polynucleotide molecule selected from the group consisting of:

a) nucleotide 88 to nucleotide 189 of SEQ ID NO:1;

b) nucleotide 88 to nucleotide 192 of SEQ ID NO:1;

- c) nucleotide 91 to nucleotide 189 of SEQ ID NO:1;
- d) nucleotide 91 to nucleotide 192 of SEQ ID NO:1;
- e) nucleotide 88 to nucleotide 189 of SEQ ID NO:4;
- f) nucleotide 88 to nucleotide 192 of SEQ ID NO:4;
- g) nucleotide 91 to nucleotide 189 of SEQ ID NO:4

and

- h) nucleotide 91 to nucleotide 192 of SEQ ID NO:4.

15. An expression vector comprising the following operably linked elements:

a transcription promoter;

a DNA segment encoding a polypeptide selected from the group consisting of:

- a) a protein of claim 1;
- b) amino acid residue 30 to amino acid residue 63 of SEQ ID NO:2;
- c) amino acid residue 31 to amino acid residue 63 of SEQ ID NO:2;
- d) amino acid residue 30 to amino acid residue 64 of SEQ ID NO:2;
- e) amino acid residue 31 to amino acid residue 64 of SEQ ID NO:2; and
- f) a polypeptide chosen from SEQ ID NOS:14-72; and a transcription terminator.

16. An expression vector according to claim 15, wherein said DNA segment further encodes a secretory signal sequence operably linked to said protein.

17. An expression vector according to claim 16, wherein said secretory signal sequence is selected from the group consisting of:

- a) a polypeptide having the sequence of amino acid residue 1 to amino acid residue 18 of SEQ ID NO:2;
- b) a polypeptide having the sequence of amino acid residue 1 to amino acid residue 20 of SEQ ID NO:2;

c) a polypeptide having the sequence of amino acid residue 1 to amino acid residue 20 of SEQ ID NO:10; and

d) a polypeptide having the sequence of amino acid residue 1 to amino acid residue 22 of SEQ ID NO:10.

18. A cultured cell into which has been introduced an expression vector according to claim 15;

wherein said cell expresses said polypeptide encoded by said DNA segment.

19. A method of producing a protein comprising: culturing a cell into which has been introduced an expression vector according to claim 15;

whereby said cell expresses said polypeptide encoded by said DNA segment; and

recovering said expressed polypeptide.

20. An oligonucleotide probe or primer comprising at least 14 contiguous nucleotides of a polynucleotide of SEQ ID NO:11 or a sequence complementary to SEQ ID NO:11.

21. A method of treating a microbial-related disease comprising administering to a mammal a therapeutically effective amount of a polypeptide selected from the group consisting of:

- a) a polypeptide of SEQ ID NO:2;
- b) a polypeptide of SEQ ID NO:10;
- c) a polypeptide chosen from SEQ ID NOS:14-72;
- d) amino acid residue 30 to amino acid residue 63 of SEQ ID NO:2;
- e) amino acid residue 31 to amino acid residue 63 of SEQ ID NO:2;
- f) amino acid residue 30 to amino acid residue 64 of SEQ ID NO:2;
- g) amino acid residue 31 to amino acid residue 64 of SEQ ID NO:2;
- h) amino acid residue 20 to amino acid residue 67 of SEQ ID NO:10 and
- i) amino acid residue 22 to amino acid residue 67 of SEQ ID NO:10;

whereby said polypeptide ameliorates said disease.

22. A method of claim 21, wherein said microbial-related disease is associated with the eye.

23. A method of claim 22, wherein said microbial-related disease is conjunctivitis.

24. A method of claim 21, wherein said microbial-related disease is associated with the ear.

25. A method of contraception comprising administering to a mammal a therapeutically effective amount of a polypeptide selected from the group consisting of:

- a) a polypeptide of SEQ ID NO:2;
- b) a polypeptide of SEQ ID NO:10;
- c) a polypeptide chosen from SEQ ID NOS:14-72;

- d) amino acid residue 30 to amino acid residue 63 of SEQ ID NO:2;
- e) amino acid residue 31 to amino acid residue 63 of SEQ ID NO:2;
- f) amino acid residue 30 to amino acid residue 64 of SEQ ID NO:2;
- g) amino acid residue 31 to amino acid residue 64 of SEQ ID NO:2;
- h) amino acid residue 20 to amino acid residue 67 of SEQ ID NO:10 and
- i) amino acid residue 22 to amino acid residue 67 of SEQ ID NO:10.

26. A method for reducing the risk of or treating a respiratory system infection by a pathogen in a mammal comprising:

administering to the mammal a therapeutically effective amount of a composition to inhibit the pathogenic infection, wherein the composition comprises:

a polypeptide demonstrating pathogen-destroying activity wherein the polypeptide comprises at least a portion of SEQ ID NO:2 or SEQ ID NO:10; and

a pharmaceutically acceptable carrier.

27. The method of claim 26 wherein the mammal is a human.

28. The method of claim 27 wherein the respiratory system infection is associated with cystic fibrosis.

29. The method of claim 26 wherein the pathogen is selected from the group consisting of *Burkholderia cepacia*, *Pseudomonas aeruginosa*, *Stenotrophomonas maltophilia*, *Staphylococcus aureus*, *Haemophilus influenzae*, *Aspergillus fumigatus*, *Candida albicans*, *mycobacteria*, *Mycoplasma*, *Escherichia coli*, *Klebsiella*, and combinations thereof.

30. The method of claim 26 wherein the at least a portion of SEQ ID NO:2 comprises at least amino acid 1 to 65 of SEQ ID NO:2.

31. The method of claim 26 wherein the at least a portion of SEQ ID NO:2 comprises at least amino acid 19 to 65 of SEQ ID NO:2.

32. The method of claim 26 wherein the at least a portion of SEQ ID NO:2 comprises at least amino acid 21 to 65 of SEQ ID NO:2.

33. The method of claim 26 wherein the at least a portion of SEQ ID NO:2 comprises at least amino acid 30 to 63 of SEQ ID NO:2.

34. The method of claim 26 wherein the at least a portion of SEQ ID NO:10 comprises at least amino acid 1 to 67 of SEQ ID NO:10.

35. The method of claim 26 wherein the at least a portion of SEQ ID NO:10 comprises at least amino acid 21 to 67 of SEQ ID NO:10.

36. The method of claim 26 wherein the at least a portion of SEQ ID NO:10 comprises at least amino acid 23 to 67 of SEQ ID NO:10

37. The method of claim 26 wherein the composition is formulated for topical, inhalant, or parenteral administration.

38. A method for reducing the risk of or treating a respiratory system infection by a pathogen in a mammal comprising:

administering to the mammal a therapeutically effective amount of a composition to inhibit the pathogenic infection, wherein the composition comprises:

a polypeptide demonstrating pathogen-destroying activity wherein the polypeptide comprises a polypeptide that is at least 80% identical to SEQ ID NO:2 or SEQ ID NO:10; and a pharmaceutically acceptable carrier.

39. The method of claim 38 wherein the mammal is a human.

40. The method of claim 39 wherein the respiratory system infection is associated with cystic fibrosis.

41. The method of claim 38 wherein the pathogen is selected from the group consisting of *Burkholderia cepacia*, *Pseudomonas aeruginosa*, *Stenotrophomonas maltophilia*, *Staphylococcus aureus*, *Haemophilus influenzae*, *Aspergillus fumigatus*, *Candida albicans*, mycobacteria, *Mycoplasma*, *Escherichia coli*, *Klebsiella*, and combinations thereof.

42. The method of claim 38 wherein the composition comprises a polypeptide selected from the group consisting of SEQ ID NO:2, SEQ ID NO:10, and combinations thereof.

43. The method of claim 38 wherein the composition is formulated for topical, inhalant, or parenteral administration.